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ATALOGUE
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JTAH MINERALS
and LOCALITIES

ith Descriptive List
d Notes for Collectors

MAYNARD BIXBY

A CATALOGUE OF

UTAH

MINERALS AND LOCALITIES

With Descriptive List,

And Notes for Collectors.

—by—

MAYNARD BIXBY.

Salt Lake City, Utah.

1904.

—o—

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MAYNARD BIXBY.

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MINERAL LOCALITIES.

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BEAVER COUNTY.

Beaver City, near; **hyalite,** banded in brownish and white to nearly colorless.

Beaver Lake District; azurite. O. K. Mine; bornite, chalcocite, chalcopyrite, covellite, copper, limonite, malachite, molybdite, pyrite.

Bradshaw District; aragonite, aurichalcite, cerussite, cuprite, malachite.

Cactus Gulch; chalcopyrite, garnet, limonite, **quartz, crystals** enclosing **tourmaline.**

English Springs; Iron ores.

Frisco; angelsite, argentite,barite, brochantite, cerargyrite, cerussite, dufrenoysite, galena, garnet, pyrargyrite, proustite, **selenite, sphalerite,** often phosphorescent, zincite, wollastonite.

Granite District; almandine garnet, barite, bismuthinite.

Indian Creek; gold.

Mooney Springs; topaz.

Rock Corral; 9 miles east of Milford,**ortnoclase crystals,** smoky quartz crystals, prase.

Rocky District; Adelia Mine, wulfenite.

Star District; azurite, bismuthinite, galena, cerargyrite, cerussite, malachite.

Burning Moscow Mine; goslarite.

Sulphurvale; sulphur.

Elsewhere; bismite, bismutite.

BOX ELDER COUNTY.

Copper Mountain Mine; azurite, cuprite, malachite.

Dove Creek; gold, garnet.

Lucin District; cerussite, galena, Empire Mine, **wulfenite** in aggregate of thin yellow plates and crystals.

North Shore of Salt Lake; asphaltum as an exudation, petroleum in shale.

Park Valley Mines; galena, gold, pyrite; monazite (?) at Century Mine.

Sierra Madre District; bornite, cerussite, chalcopyrite, galena, gold, malachite, molybdenite, rose quartz.

New Foundland District; cerussite, galena, copper minerals.

Vipont Mine; wire silver and gold, ruby silver, pyrite.

Elsewhere; Utah onyx (aragonite or travertine.).

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CACHE COUNTY.

Blacksmith Fork; cerussite, galena.
La Plata; azurite, cerussite, galena, malachite.
Logan; near, cuprite, variety chalcotrichite.
Richmond; near, galena.
Southeastern part of County; iron ores.

CARBON COUNTY.

Castle Gate; coal, **native coke.**
Eastern part of County; iron ores.
Pleasant Valley, Sunnyside; coal.
Whitmore Canon; ozocerite in sandstone, asphaltum and other hydrocarbons.
Winter Quarters Mine; coal, copalite on coal.

DAVIS COUNTY.

Antelope Island; copper minerals, epidote, garnet, micaceous hematite.
Farmington, in hills east of; azurite, bornite, gold, malachite.
Lake Shore in winter; mirabilite.

EMERY COUNTY.

Castle Valley; agates, azurite, and malachite in sandstone, chalcedony, epsomite (?), silicified trunks of trees containing pockets of loose **quartz crystals.**
Copper Globe Mine; copper minerals.
San Rafael River; red alabaster.
San Rafael Swell, S E of Emery; carnotite, gummite, uraninite.
Summerville District; copper minerals, cerussite, galena.

GARFIELD COUNTY.

Cannonville; wheelerite.
Coyoto, near; orpiment, realgar, stibnite.
Between Junction and Coyoto; copper minerals.
Henry Mts; bornite, chalcopyrite, coal, gold, octahedral **pyrite.**
Moss Agate Hill near Panguitch; moss agates.

GRAND COUNTY.

Cisco, near; **agates,** fine **red jasper casts** of fossil shells chalcedony, travertine.
Richardson, near; carnotite, copper minerals, galena.
Salt Wash; copper minerals.
Thompsons, near; **selenite** crystals.

IRON COUNTY.

Cedar City, west of; magnetite crystals, occasionally

with apatite crystals, lodestone. In hills east of Cedar City; coal, selenite.

Coyote District; orpiment, realgar in strata under lava, stibnite.

State Line; argentite, gold, pyrite, silver sulphides.

Southeastern part of Co.; coal.

JUAB COUNTY.

Bavarian Con. Mine, 3 miles S E of Eureka; seam of coal in porphyritic formation.

Diamond District; cerussite, galena, quartz crystals enclosing liquids at Miller Mine.

Fish Springs; angelsite (?) cerargyrite, cerussite, galena.

Tintic District; Boss Tweed Mine; azurite, cuprite, malachite, bismite.

Carissa Mine; aurichalcite, azurite, barite, bismutite, brochantite, calcite, chrysocolla, conichalcite, cuprite, copper, enargite, lettsomite, malachite, mixite, olivenite, pittiscite, scorodite, utahite, and near by, greenish garnet in limestone.

Emerald Mine; native bismuth crystals.

Mines of Eureka; aragonite, argentite, anglesite, azurite, barite, brochantite, calcite, calamine, cerargyrite crystals, cerussite crystals, chrysocola, clinoclasite crystals, conichalcite, cuprite, enargite, erinite, gold, galena, jarosite crystals, leadhillite crystals, limonite, linarite crystals, malachite, melaconite, mixite, mimetite, red, white and green oliventite, variety of oliventite containing zinc, pearceite crystals, pyrite, pharmacosiderite, quartz crystals, sulphur crystals occasionally included in angelesite crystals, silicious stalactites, silver, selenite, tyrolite crystals, utahite crystals, zeunerite crystals, pseudomorphs of dolomite and oliventite after calcite, and many other pesudomorphs. Godiva Mine; minium, selenite.

Homestake and Shoebridge Mines; enargite crystals.

Humbug Mine; anglesite, cerussite, galena, stephanite.

Iron Mine; bismuth minerals, cerargyrite, hematite, limonite.

Levan, near; variegated alabaster of brownish and yellowish tints.

Mines of Mammoth; argentite, aragonite, azurite, barite, borickite (?), brochantite, calcite, cerussite, chenevixite, cerargyrite, clinoclasite, cuprite, conichalcite, enargite, erinite, galena, gold, jarosite, lettsomite, malachite, melaconite, mixite, oliventite, pyrite, pharmacosiderite, selenite, scorodite, tyrolite, utahite, pseudomorphs of limonite, malachite, and quartz after calcite, also a great variety of other pseudomorphs, stalactitic hematite, and masses of curled plates of hematite.

Nephi; gypsum, halite.

Sioux Mine; azurite, galena, malachite, quartz and dolomite crystals.

Sunbeam Mine; octahedral pyrite.

Swansea Mine; anglesite, cerussite, galena, pyrite, **silver,** sphalerite.

Victor Mine; blue calamine.

Elsewhere in Tintic Dist.; bornite, bismutite, chalcopyrite, chalcocite, **aluminous chrysocolla.**

Thomas Mts, 9 miles northerly from Drum Springs; chalcedony, carnelian, garnet, variety almandine, hyalite, transparent colorless **topaz crystals** loose in soil and in rhyolite, **sherry tinted topaz crystals** in rhyolite with bluish quartz crystals, sanadin, and hematite crystals, and occasionally including these minerals, **topaz grayish** and **opaque** from inclusions of quartz crystals.

West Tintic District; cerussite, galena, molybdenite, pyrite.

KANE COUNTY.

Alum Hills; alum minerals.

Johnson and Kanab Creeks; coal, gypsum.

Kimball Valley; gypsum.

Paria, near; alum minerals, coal, gypsum.

Paria Mining Co; azurite, cuprite, malachite.

MILLARD COUNTY.

Antelope Springs, near; pyrite cubes, altered to limonite, in slate.

Black Rock, near; **red** and **black mottled,** and **spherulitic obsidian.**

Cove Creek Sulphur Mines; sulphur crystals, pseudomorphs of sulphur after twigs, leaves, cones, etc.

Detroit District; azurite, bismutite, cuprite, chalcedony, hematite crystals three miles north, jasper, malachite, pyrite altered to limonite, pyrolusite.

Kanosh, near; gypsum in large bed, manganese minerals.

Sawtooth; garnet, copper and lead minerals, molybdenite.

Twin Peaks; white apatite, augite, and **martite crystals** loose in soil, and in place in eruptive rocks.

Elsewhere in County; galena, **Utah onyx.**

MORGAN COUNTY.

Carbonate Hill Mine, near Peterson; cerussite.

Copper Mountain Mine; copper minerals.

PIUTE COUNTY.

Belknap, near; pyrolusite.

Bully Boy and Webster Mines; large "sceptre" **quartz crystals,** wulfenite.

Dalton Mine; gold, rhodochrosite, tellurium minerals.

Deer Creek; alum minerals, copper minerals, white barite crystals, selenite.

East of Marysvale in foot hills; amethystine quartz, selenite.

Green Eyed Monster Mine; large pyrite crystals altered to limonite.

Ohio; cerussite, chalcocite, chalcopyrite, galena, malachite, tetrahedrite.

Mt Baldy; anglesite, argentite at Pluto Mine, cerussite, cerargyrite with gold, **galena, wulfenite,** tellurium minerals.

Sevier Canon, near Deer Creek; satin spar.

Six miles south of Marysvale at quicksilver mine; onofrite, tiemannite crystals.

Elsewhere in County; galena, garnet, gold, **blue hyalite.**

RICH COUNTY.

Western part; iron minerals.

SALT LAKE COUNTY.

Alum Point; bushmanite.

Big Cottonwood; anglesite, aurichalcite at **Carbonate and Keeler mines; cerussite,** galena, malachite, pyrolusite, wulfenite at **Woodlawn mine;** molybdenite, cuprite at **Copper King Mine.**

Bingham; Queen Mine, argenite, barite; Tiewaukee Mine, binnite; Winnamuck Mine, dufrenoysite, pyrargyrite, rhodochrosite; tetrahedrite at Eighty Nine Mine; fine crystals of **enargite** at Commercial Mine.

Bingham Canon; wood replaced by copper and malachite, native copper.

Butterfield Canon; realgar, orpiment, **luckite** and **mallardite** at Lucky Boy Mine; rhodochrosite.

Carrs Fork and Bingham Canon; native copper, placer gold.

Draper, near; kaolinite.

Highland Boy Mine; chalcopyrite, cuprite, **pyrite.**

Little Cottonwood; dufrenoysite rarely; caledonite crystals; chalcopyrite at Oxford and Geneva Mines; linarite at Grizzly and other mines; **wulfenite** in delicate yellow crystals at City Rock Mine. At Little Emma Mine; anglesite, calamine, chrysocolla, cerussite, cervantite, galena, malachite, pyrite, pyrolusite, sphalerite, stephanite, wulfenite.

New State Mine, near mouth of Big Cottonwood Canon; gold.

Old Jordan and Galena Mines; cerussite, **chalcopyrite, enargite** crystals, **galena, goslarite,** milky opal, pisanite, (?) **pyrite, sphalerite,** "sceptre" **quartz crystals, tetrahedrite** crystals with wire silver.

Parley's Canon; greenish granular corundum.

Salt Lake Shore; mirabilite in winter.

SAN JUAN COUNTY.

Golden Queen and other mines; gold.

Halletts Creek and in S W part of County; coal.

La Sal Mts; copper minerals, manganite crystals showing fine red translucency, molybdenite.

Near San Juan River below Bluff City; chalcopyrite, copper, malachite, silver.

Elsewhere; garnet, variety pyrope, amethyst, olivine, placer gold.

SAN PETE COUNTY.

Gunnison; halite in fine cubes.

Elsewhere; coal, gypsum, iron minerals.

SEVIER COUNTY.

Fish Lake; common opal.

Foot hills north of Glenwood; chalcedony geodes, selenite.

Salina Canon; coal with **yellow hydrocarbon, copalite,** (?) galena in sandstone.

Elsewhere; fullers earth, orpiment in clay, opalized wood.

SUMMIT COUNTY.

Bonanza Flat; green garnet (grossularite) in crystals and massive.

Coalville; coal.

Daly Judge Mine; large crystals of galena, fluorite.

Daly West Mine; quartz crystals with sphalerite crystals.

Other Park City Mines; anglesite, azurite, **cerussite, cerargyrite,** galena, malachite, sphalerite occasionally phosphorescent, pyrite, tetrahedrite.

Silver King Mine; azurite, **cerussite,** galena, malachite.

Uintah; anglesite, argentite, cerargyrite, tetrahedrite, malachite.

TOELLE COUNTY.

Brickyard Mine at Mercur; melanterite, orpiment crystals (and foliaceous), **realgar crystals,** sulphur.

Clifton District; Gold Hill mines; azurite, bornite, gold in calcite, garnet, malachite. Holstein group; copper minerals. Albany Group; azurite, chalcopyrite, chrysocolla, galena, malachite. Pole Star Group; azurite, conichalcite, cuprite, malachite, olivenite, tetrahedrite, pyrite. Cyclone Group; wulfenite. Troy Group; tellurium minerals.

Deep Creek Region; agates, cerussite, chalcedony, galena.

Dry Canon; at Kearsarge Mine; hessite. At Mono Mine; azurite, cerargyrite, galena, malachite, coppper, silver, stephanite.

Dutch Mountain; augite, azurite, cerussite, fluorite, galena, malachite.

Dugway; barite with pink and white fluorite, and copper, cerussite, cerargyrite, cuprite, fluorite of variegated color and enclosing galena, magnetite, silver, wulfenite rarely in pyramidal crystals.

Dugway Range, about fifteen miles south of Dugway; bixbyite on topaz and rhyolite, chalcedony geodes, garnet crystals on topaz and rhyolite, altered to topaz, etc, **topaz crystals** often opaque from inclusions of quartz red apatite crystals on topaz crystals.

Geyser-Marion Mine, at Mercur; calcite, **cerargyrite,** (Sparrow Hawk Claim), cinnabar, jarosite, stibnite, variscite.

Golden Gate Mine, Mercur; arsenopyrite, **calcite, cinnabar,** realgar with **orpiment.**

Granite Mountain; galena, kaolinite.

Hillside Mine, Mercur; cinnabar, orpiment, sulphur.

Johnsons Pass; galena, **Utah onyx** of greenish and other shades.

Lion Hill, near Ophir; cerargyrite, cerussite, galena, **utahite** rich in silver.

Mercur Mine; calcite red from included realgar, cinnabar, **orpiment** crystals, realgar crystals, **selenite, variscite.**

Midas Mine; gold with molybdenite (?).

Mineral Hill; cerussite, copper minerals, galena.

Ophir; aurichalcite, calcite, cerussite, cerargyrite, chalcopyrite, **fluorite** with **dolomite** crystals, malachite, **pyrite, smithsonite** crystals, **tetrahedrite** crystals with white fluorite.

Overland Canon near Clifton; bismuthinite (?).

Pine Canon near Tooele; vesuvianite.

Sacramento Mine at Mercur, cinnabar, orpiment, realgar, sulphur.

Stockton; cerussite, galena, pyrite.

Sunshine; cinnabar, orpiment, sulphur.

Wild Cat Mountain; fluorite with silver, prosopite.

Elsewhere; graphite.

UINTAH COUNTY.

Ashley, near; cannel coal, asphaltum, carnotite.

Asphalt Creek; asphaltum.

Bullionville District; copper minerals.

Fort DuChesne, near; **gilsonite.**

Ouray, near; gypsum.

Elsewhere and on Uncompahgre Reservation; gilsonite, ozocerite, wurtzilite.

UTAH COUNTY.

American Fork Canon; cerussite, galena, molybdenite, pyrite, **tetradymite,** tetrahedrite.

Clay Canon, near **Fairfield variscite, wardite.**

Lakeside Mts.; chalcanthite, **iceland spar**, large **pyrite** crystals altered to limonite and hematite, **Utah Onyx.**

Mill Fork Station; coal.

Soldier Summit, and near **Pleasant Valley Junction**; ozocerite, and other **hydrocarbons.**

Springville, near; **Utah onyx, black fossil marble.**

Thistle Junction, 3 miles east; **geodes** enclosing hydrocarbons in a viscid state.

Elsewhere; coal, alabaster, tschermigite.

WASATCH COUNTY.

Blue Ledge and Snake Creek; cerussite, galena, pyromorphite, spalerite.

Strawberry Creek; hydrocarbon compounds.

South East corner, near Smith's Well; gilsonite.

Wasatch Range, west of Midway; **green garnet** (grossularite), olive green zonal **muscovite**, showing asterism, **phosphorescent limestone**, copper minerals.

WASHINGTON COUNTY.

Beaver Dam Mts; realgar.

Dixie Mines; **aurichalcite**, azurite, **copper**, **cuprite**, limonite, **malachite.**

Silver Reef; in sandstone, argentite, azurite, **autunite, cerargyrite**, malachite, silver, **fossil plants** and **trees replaced** by **argentite**, coal, copper minerals, cerargyrite and silica.

St. George, west of 20 miles; iron minerals, antimonial minerals.

Virgin River, transparent halite.

Washington, near; earnotite.

Elsewhere; gypsum.

WAYNE COUNTY.

Fremont River; **selenite crystals** of very large size, occasionally enclosing liquids.

Starvation Creek; coal.

Elsewhere; hematite, gold.

WEBER COUNTY.

Huntsville, ten miles east; **pyrolusite.**

Ogden Canon; hornblende, **limonite**, uraninite.

Elsewhere; cerussite, galena.

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The following minerals have been variously reported, but need confirmation; albandite, arsenic, arsenolite, atacamite, barytocalcite, boulangerite, catseye, chalcophanite, chiolite, cubanite, embolite, franklinite, friesslebenite, hausmannite, ilmenite, iron silicates, magnesite, miargyrite, phenacite, phosgenite, polybasite, pyrochroite, ruby, sapphire, spinel, strontianite, witherite.

Notes for Collectors of Minerals.

Tintic District.—This district is noted for its fine specimens of the rare copper arsenates, as well as for its great variety of mineral species. Pearceite in crystals has been one of the rarest noted, and the specimens seen have been most remarkable in size, the largest being a half an inch or more across. The crystals are of tabular habit, coated with a bluish substance, and were associated with small brilliant crystals of enargite and anglesite. The crystals also show the peculiar triangular markings noted by Prof. S. L. Penfield in describing pearceite from Montana. Less than a half dozen specimens of this mineral have been preserved. Zeunerite also occurs with exceeding rarity, the crystals varying in color from yellowish to a deep olive, almost emerald green. They are of thin tabular habit, the largest being less than one fourth of an inch across. Olivenite has been abundant at times, but the red tinted specimens have been quite rare. The red crystals are usually very minute, and range in color from a light reddish brown to a deep blood red. They afford beautiful mounts for the microscope, and are usually found densely lining small cavities in a hard silicious ore, occasionally with enargite, also with anglesite, and included in the latter mineral. White olivenite occurs sparingly in very delicate felted bunches of capillary crystals. Scorodite occurs in crystals of fine quality, the largest nearly one fourth of an inch in size, of a bluish green color, also of brown tints. Leadhillite has been observed rarely, but the crystals seen were of good quality, nearly colorless, and averaged possibly more than a half an inch across. Anglesite occurs in a great variety of form, and its crystalography would be well worth careful investigation. Many fine translucent and transparent crystals have been collected, ranging in color from colorless and white, to dark grayish, and a fine yellow. Crystals measuring about two inches in length have been preserved and larger specimens have been reported. Cerussite has been seen rarely in beautiful nearly transparent twin crystals. Cuprite is rarely seen crystalized. A small quantity of mimetite was found, occurring in very delicate white, grayish and yellow, long slender hexagonal crystals. Brilliant small crystals of enargite have been observed at the mines of Eureka, also in large crystals of dull lustre at the Homestake Mine, near Silver City, and of smaller size at the mines of Mammoth. Very fine crystalizations of this mineral have been obtained at the Commercial Mine, Bingham. Mixite has been collected at various mines of the Tintic District, but of finest quality at the Carissa Mine, where it frequently occurs in minute acicular crystals forming beautiful pale green velvety surfaces, largely in a barite

gangue. Notable crystals of brochantite were found at the Eureka Hill Mine, the largest a half inch or more in length, and of the wedge habit. No other locality has furnished such crystals of this mineral. A very few remarkable crystals of linarite have been seen. A few specimens of Utahite in good sized crystals have been collected. Pseudomorphs in great variety occur in the Tintic mines.

Topaz Localities.

The Thomas Mountain localities are situated in Juab County, about nine miles in a northerly direction from Drum Springs, in the Detroit District, or about 55 miles in a northwesterly direction from Desert. The topaz crystals occur in cavities and seams of a light gray rhyolite, a great belt of which has been pushed up for 20 miles or more in both northerly and southerly directions from Thomas Mountains. The loose colorless crystals are found on the hillsides, and in the sands of the dry gulches, where they glitter in countless numbers. The sherry colored crystals are obtained by blasting the richer spots in the rhyolite, where the crystals are found attached to the sides of the cavities, and frequently loose in them, with a soft kaolin-like material. These colored crystals bleach very rapidly on exposure to the light, and particularly when exposed to the direct rays of the sun, losing nearly all color in a day. The writer has been unable to find any explanation of this fact. The largest topaz crystals have been found at the bixbyite locality in the Dugway Range, about 15 miles from Thomas Mountains, and several miles southerly from the Dugway grade. Opaque crystals of much larger size than any of the transparent kinds, filled with quartz, and occasionally with black cubes of bixbyite attached, have been found here sparingly. The curious groups of opaque gray topaz from Thomas Mountains are of exceedingly rare occurrence, in perfection, though many imperfect specimens are seen. The more imperfect crystals of the gray topaz appear as if eroded by some solvent. These topaz localities are exceedingly interesting to the mineralogist, and good specimens are obtainable at any time.

Tiemannite and Onofrite.

The locality near Marysvale has produced the only crystals of tiemannite known, and many fine specimens have been obtained, the largest probably one fourth of an inch across. They are generally of the tetrahedral habit and highly modified. No crystals of onofrite have been reported. These minerals occur in a limestone gangue, the crystals appearing in open seams. Crystalized specimens are reported unobtainable now.

Orpiment and Realgar.

Probably the finest and largest known crystals of these minerals have been found in the gold mines of Mercur, mainly in the Mercur, Golden Gate and Brickyard mines. Crystals of great perfection and an inch or more in length, have been collected from these mines. The discovery of perfect crystals of orpiment including many of twinned habit, enabled the classification of this mineral in its proper system of crystalization, viz.: in the monoclinic system, the crystals hitherto found being so imperfect that it was placed in the orthorhombic system. Groups of orpiment crystals occur with realgar crystals rarely among them. Beautiful crystals of realgar occur with crystals of calcite, and often penetrating the latter.

Variscite.

Variscite in large nodules associated with bluish wardite, has been one of the notable finds in Clay Canon, near Fairfield. Large specimens of fine green color, eight inches or more across, have been mined, which, sawed into sections and polished, made showy specimens for the collection.

Martite.

The largest crystals of this form of hematite known have been collected at Twin Peaks, Millard County. Octahedral crystals, showing but one termination, and five inches or more across, have been collected. Groups of martite crystals are also sparingly seen, associated with crystals of augite and apatite. These specimens were collected in the soil, and consequently somewhat bruised, but smaller crystals are found in place in the eruptive rock of the mountains.

Rare Minerals.

Among the rare minerals, bixbyite, luckite, mallardite, wardite and utahite have not been reported outside of Utah. A mineral, however, giving the reactions and having the appearance of utahite, has been found near Morenci, Arizona. Zeunerite is exceedingly rare at the mines of Tintic, but a half dozen or so having been preserved. It is possible that a small percentage of uranium runs through some of the Tintic ores. About two dozen specimens of lettsomite have been found, while chalcophyllite has been reported in but one or two specimens. Carnotite occurs in sandstone, near Richardson, also S E of Emery, Emery Co., and in other localities. Uraninite occurs in very small quantity at the localities. Dufrenoysite and binnite are probably unobtainable at present. The best specimens of covellite have been ob-

tained at the O. K. Mine, but the mineral is rather friable. Copper arsenates, similar to those of Tintic, have been found at mines near Clifton, and with development of the prospects there interesting finds may be made. The less rare molybdenite, which seems to be coming into commercial use, has been found in several localities, but no crystals have been reported. Utah has been and will continue to be an interesting field for the mineralogist, and it is to be regretted that no institution exists, as in some neighboring States, to which the mines would be obliged to furnish good specimens of the various minerals discovered, for preservation in the interests of science.

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DESCRIPTIVE LIST OF MINERALS.

Abbreviations Used in the Following List:

H, hardness; G, gravity; S, streak; Comp., composition.

Figures given for composition of minerals represent percentages, and are taken from the best authorities. They give the analyses for pure minerals, and specific analyses of Utah species, where obtainable.

AGATE. Variegated chalcedony.

ALABASTER. Massive granular gypsum.

ALMANDINE. Iron-aluminium garnet.

AMETHYST. Quartz colored by manganese.

AMPHIBOLE. Hornblende. Bisilicate of protoxide bases.

ANDRADITE. Calcium-iron garnet.

ANGLESITE. Sulphate of lead. H., 2.75--3; G., 6.12--6.39; color, white, yellow grayish, greenish, bluish. Comp., sulphur trioxide, 26.4; lead oxide, 73.6.

APATITE. Phosphate of calcium. H., 4.5--5; G., 3.17--3.23; color, sea green, violet blue, gray, flesh red, bluish green, white, yellow, brown. Comp., approximately phosphorus pentoxide, 41.6; lime, 53.94; fluorine, 3.30, with traces of iron and alumina.

ARAGONITE. Carbonate of calcium. H., 3.5--4; G., 2.93--2.95; color, white, gray, yellow, green, violet. Comp., carbon dioxide, 44; lime, 56.

ARGENTITE. Silver sulphide. H., 2--2.5; G., 7.20--7.36; color and S., blackish lead gray, streak shining. Comp., sulphur, 12.9; silver, 87.1.

ARSENOPYRITE. Sulph-arseride of iron. H., 5--5.6; G., 5.9--6.5; color, silver white to steel gray; S., grayish black. Comp., sulphur, 19.7; arsenic, 46; iron, 34.3.

ASPHALTUM. Mineral pitch; a mixture of hydrocarbons.

AUGITE. Aluminous variety of pyroxene. H., about 6; G., about 3.30; color, green, yellow, black. Utah mineral black. Comp., approximately silica, 47; alumina, 10; magnesia, 16; lime, 19; iron oxides, 8.

AURICHALCITE. Hydrous carbonate of copper and zinc. H., 2; G., 3.54--3.64; color, pale green, verdigris green, to sky blue. S., pale greenish or bluish. Comp., carbon dioxide, 16.1; zinc oxide, 53.2; cuprie oxide, 20.8; water, 9.9.

AUTUNITE. Hydrous phosphate of uranium and calcium. H., 2--2.5; G., 3.5--3.19; color, lemon yellow to sulphur yellow. S., yellowish. Comp., phosphorus pentoxide, 15.5; uranium trioxide, 62.7; lime, 6.1; water, 15.7.

AZURITE. Hydrous carbonate of copper. H., 3.5--4; G., 3.77--3.83; color, azure blue. Comp., carbon dioxide, 25.6; cuprie oxide, 69.2; water, 5.2.

BARITE. Sulphate of barium. H., 2.5--3; G., 4.3--4.6; color, white, yellow, gray, blue red, brown; S., white. Comp., sulphur trioxide, 34.3; baryta, 65.7.

BISMITE. Bismuth trioxide. G., 4.36; color, greenish, yellow, straw yellow, grayish white. Comp., oxygen, 10.4; bismuth, 89.6.

BISMUTHINITE. Bismuth sulphide. H., 2; G., 6.4--6.5; S. and color, lead gray to tin white. Comp., sulphur, 18; bismuth, 81.2.

BISMUTITE. Basic bismuth carbonate. H., 4--4.5; G., 6.86--6.90; color, white, mountain green, siskin green, straw yellow, yellowish gray; S., greenish gray to colorless. Comp., carbon dioxide, 6.56; bismuth trioxide, 90; water, 3.44.

BINNITE. Sulph-arsenide of copper. H., 2.5--3; G., 4.47; color, steel gray to iron black, sometimes brownish; S., reddish brown. Comp., sulphur, 29.8; arsenic, 31; copper, 39.2.

BIXBYITE. Oxide of iron and manganese. H., 6--6.5; G., 4.94; color, brilliant black. Comp., iron pentoxide, 47.98; manganese oxide, 42.05; oxygen, 4.38; alumina, 2.53, with small quantities of silica and titanium.

BORICKITE. Hydrous phosphate of iron and calcium. H., 3.5; G., 2.6--2.7; S. and color, reddish brown. Comp., phosphorus pentoxide, 20.49; iron trioxide, 52.29; lime, 8.6; water, 19.06.

BORNITE. Sulphide of copper and iron. H., 3; G., 4.9--5.4; color, between copper red and pinchbeck brown; S., pale grayish black. Comp., sulphur, 28.1; copper, 55.5; iron, 16.4.

BROCHANTITE. Hydrous sulphate of copper. H., 3.5--; G., 3.9; color, emerald green to blackish green; S., green, paler than color. Comp., Utah mineral, cuprie oxide, 68.7; water, 12.44; sulphur trioxide, undetermined.

BUSHMANITE. Hydrous sulphate of aluminium, manganese and magnesium. H., 1.5; G., 1.78; color,

white with tints of rose, green and yellow. Comp., Utah mineral, sulphur trioxide, 35.85; alumina, 10.40; manganese oxide, 2.12; oxide of magnesium, 5.94; water, 46 with traces of iron and potassium.

CALCITE. Calcium carbonate. H., 3; G., 2.71; color, white and various pale shades of gray, red, green, blue, yellow, violet, also brown and black when impure. Comp., carbon dioxide, 44; lime, 56.

CALEDONITE. Sulphate of lead and copper. H., 2.5-3; G., 6.4; color, deep verdigris-green or bluish-green. S., greenish white. Comp., sulphur trioxide, 17.9; lead protoxide, 66.3; cupric oxide, 11.8; water, 4.0.

CANNEL COAL. Variety of bituminous coal; dull black or grayish black, and on distillation affording 40 to 60 per cent. volatile matter, including a large proportion of oil.

CARNOTITE. A hydous compound of uranium, potassium and vanadium. A yellowish crystalline powder occurring mixed with quartzose sand. Color, yellow. Comp., vanadium pentoxide, 20.12; uranium trioxide, 64.70; potassium oxide, 10.97; water, 5.19; approximately, with trace of iron.

CARNELIAN. Red chalcedony.

CALAMINE. Hydrous silicate of zinc. H., 4.5--5; G., 3.40--3.50; color, white, greenish, bluish, yellow to brown; S., white. Comp., silica, 25; zinc oxide, 67.5; water, 7.5.

CERARGYRITE. Chloride of silver. H., 1--1.5; G., 5.55; color, pearl gray, grayish green, whitish to colorless, rarely violet blue. Comp., chlorine, 24.7; silver, 75.3.

CERVANTITE. Binoxide of antimony. H., 4.5; G., 4.08; color, sulphur yellow, isabella yellow to nearly white or reddish white; S., yellow to white. Comp. oxygen, 21.1; antimony, 78.9.

CERUSSITE. Carbonate of lead. H., 3--3.5; G., 6.46 --6.57; color, white, gray, grayish black, sometimes blue or green from copper. Comp., carbon dioxide, 16.5; lead oxide, 83.5.

CHALCOCITE. Cupreous sulphide. H., 2.5--3; G., 5--5.8; color and S., blackish lead gray. Comp., sulphur 20.2; copper, 79.8.

CHALCOPYRITE. Sulphide of copper and iron. H., 3.5--4; G., 4.1--4.3; color, brass yellow, often tarnished or irridescent; S., greenish black. Comp., sulphur, 35; copper, 34.4; iron, 30.5.

CHALCOPHYLLITE. Basic arsenate of copper. H., 2; G., 2.4--2.6; color, emerald green or grass green to verdigris green; S., paler than color. Comp., approximately arsenic pentoxide, 18; cupric oxide, 50; water, 32.

CHENEVIXITE. Arsenate of copper and iron. H., 3.5--4; G., 3.93; color, mountain green, bluish green to greenish yellow; S., yellowish green. Comp., arsenic

pentoxide, 38.2; cupric oxide, 26.3; iron sesquioxide, 26.5; water, 9.

CHRYSOCOLLA. Hydrous silicate of copper. H., 2--4; G., 2--2.38; color, mountain green, bluish green, passing into sky blue and turquoise blue, brown to black when impure. S., when pure, white. Comp., silica, 34.3; copper oxide, 45.2; water, 20.5.

CHALCOTRICHITE. Capillary cuprite.

CHALCEDONY. Cryptocrystaline quartz. H., 7; G., 2.6--2.64; color, white, grayish, pale to dark brown, bluish.

CHALCANTHITE. Hydrous sulphate of copper. H., 2.5; G., 2.12--2.30; color, berlin blue to sky blue, sometimes green; S., uncolored. Comp., sulphur trioxide, 32.1; cupric oxide, 31.8; water, 36.1.

CINNABAR. Sulphide of mercury. H., 2--2.5; G., 8--8.2; color, cochineal red, inclined to brownish red and lead gray; S., scarlet. Comp., sulphur, 13.8; mercury, 86.2.

CLINOCLASITE. Hydrous arsenate of copper. H., 2.5--3; G., of Utah mineral, 4.36--4.38; color, blackish blue green, internally dark verdigris green; S., bluish green. Comp., arsenic pentoxide, 29.59; cupric oxide, 62.44; water, 7.72, with traces of zinc, iron, etc.

CONICHALCITE. Hydrous arsenate of copper and calcium. H., 4.5; G., 4.12; color, pistachio green, inclined to emerald green; S., same as color. Comp., Utah mineral, arsenic pentoxide, 39.94; cupric oxide, 28.68; lime 19.79; water, 5.52; zinc oxide, 2.86, with traces of silver, iron, etc.

COPALITE. An oxygenated hydrocarbon. G., 1.01--1.05; color, pale clear yellow to dirty gray and dirty brown. Comp., approximately, carbon, 85.7; hydrogen, 11.47; oxygen, 2.84.

COPPER. Metallic or native copper.

COVELLITE. Cupric sulphide. H., 1.5--2; G., 4.5--4.6; color, indigo blue or darker; S., lead gray to black, shining. Comp., sulphur, 33.6; copper, 66.4.

CORUNDUM. Oxide of aluminium. H., 9; G., 3:95--4.10; color, blue, red, yellow, brown, gray, to smoky white and colorless. Comp., oxygen, 47.1; aluminium, 52.9.

CUPRITE. Cupreous oxide. H., 3.5--4; G., 5.85--6.15; color, red of various shades, particularly cochineal red, sometimes almost black, occasionally crimson red by transmitted light; S., several shades of brownish red. shining. Comp., oxygen, 11.2; copper, 88.8.

DOLOMITE. Carbonate of calcium and magnesium. H., 3.5--4; G., 2.8--2.9; color, white, reddish or greenish white, rose red, green, brown, gray and black. Comp., carbon dioxide, 47.8; lime, 30.4; magnesia, 21.7.

DUFRENOYSITE. Sulph-arsenate of lead. H., 3;

G., 5.55--5.57; color, blackish lead gray; S., reddish brown. Comp., sulphur. 22.2; arsenic, 20.7; lead, 57.1.

ENARGITE. Sulph-arsenide of copper. H., 3; G., 4.43--4.45; color, grayish black to iron black; S., grayish black. Comp., sulphur, 32.6; arsenic, 19.1; copper, 48.3.

EPODITE. Silicate of iron, alumina and calcium. H., 6--7; G., 3.25--3.6; color, pistachio green, yellowish green to brownish green, greenish black, black, clear red and yellow, gray, white, colorless rarely. Comp., approximately, silica, 39; alumina, 25; iron oxide, 25; lime, 24; water, 2.

EPSOMITE. Hydrous magnesium sulphate. H., 2.5; G., 1.75; color and S., white. Comp., sulphur trioxide, 32.5; magnesium, 16.3; water, 51.2.

ERINITE. Hydrous arsenate of copper. H., 4:5--5; G., 4.04; color, emerald green, inclining to grass green; S., green, paler than color. Comp., Utah mineral, arsenic pentoxide, 32.07; cupric oxide, 56.56; water, 6.86, with small quantities of iron, calcium, etc.

FLUORITE. Fluoride of calcium. H., 4; G., 3.18; color, white, yellow, green, rose, and crimson red, violet and sky blue, brown, wine yellow, greenish blue, violet blue common, rarely red; S., white. Comp., fluorine, 48.9; calcium, 51.1.

GALENA. Sulphide of lead. H., 2.5--2.75; G., 7.4--7.6; color and S., lead gray. Comp., sulphur, 13.84; lead, 86.6.

GILSONITE. Hydrocarbon compound. H., 2--2.5; G., 1.06--1.07; color, brilliant black; S., rich brown. Brittle.

GLAUBERITE. Sulphate of lime and soda. H., 2.5--3; G., 2.7--2.85; color, pale yellow or gray, sometimes brick red. Comp., sulphur trioxide, 57.6; lime, 20.1; soda, 22.3.

GOLD. Native gold.

GOSLARITE. Hydrous sulphate of zinc. H., 2.5--3; G., 1.9--2.1; color, white, reddish, bluish, yellowish. Comp., sulphur trioxide, 27.9; zinc oxide, 28.2; water, 43.9.

GRAPHITE. Carbon, often impure from mixtures of clay, iron, etc. H., 1--2; G., 2.09--2.23; color, iron black to steel gray.

GROSSULARITE. Calcium-aluminium garnet. H. 6.5--7.5; G., 3.55--3.66; color, white, pale green, amber and honey yellow, wine yellow, brownish yellow, cinnamon brown, pale rose red, rarely, emerald green from presence of chromium. Comp., silica, 40; alumina, 22.7; lime, 37.3.

GUMMITE. Altered uraninite of doubtful composition. H., 2.5--3; G., 3.9--4.20; color, reddish yellow to orange or hyacinth red, reddish brown; S., yellow. Contains a large percentage of uranium trioxide.

GYPSUM. Hydrous sulphate of calcium. H., 1.5--2; G., 2.31--2.32; color, usually white, sometimes gray, flesh red, honey yellow, ochre yellow, blue, impure varieties

often black, brown, red or reddish brown; S., white. Comp., sulphur trioxide, 46.6;, lime, 32.2; water, 20.9.

HALITE. Rock salt. Chloride of sodium. H., 2.5; G., 2.1--2.6; color, white, reddish, bluish, purplish. Comp., chlorine, 39.4; sodium, 60.6.

HEMATITE. Iron sesquoxide. H., 5.5--6.5; G., 4.9--5.3; color, dark steel gray or iron black, when earthy, red; S., cherry red or reddish brown. Comp., oxygen, 30; iron, 70.

HESSITE. Telluride of silver. H., 2.5--3; G., 8.31--8.89; color, between lead gray and steel gray. Comp., tellurium, 36.7; silver, 63.3.

HYALITE. Variety of opal. Color, clear colorless, brownish or reddish. See opal.

ICELAND SPAR. Transparent, doubly refracting calcite.

JAROSITE. Hydrous sulphate of iron and potassium. H., 2.5--3; G., Utah mineral, 3.16; color, yellow, yellowish brown, clove brown, to nearly black; S., yellow, shining. Comp., Utah mineral, sulphur trioxide, 28.93; iron sesquioxide, 51.16; potassium, 9.5; water, 10.24.

JASPER. Quartz colored with iron oxides. H., 7; G., 2.60; color, red, brown, gray, yellow, blackish, green, or banded in various colors.

KAOLINITE. Hydrous silicate of aluminium. H., 2--2.5; G., 2.6--2.63; color, white, grayish white, yellowish, sometimes bluisn or reddish. Comp., silica, 46.5; alumina, 39.5; water, 14.

LEADHILITE. Sulpho-carbonate of lead. H., 2.5; G., 6.26--6.44; color, white, yellow, gray, greenish; S., uncolored. Comp., sulphur trioxide, 7.4; carbon dioxide, 8.2; lead oxide, 82.7; water, 1.7.

LETTSOMITE. Hydrous sulphate of copper and aluminium. Color, clear smalt blue, passing into sky blue. Comp., Utah mineral, sulphur trioxide, 12.60; alumina, 15.45; cupric oxide, 49.54; water, 21.50, with a little iron.

LIMONITE. Hydrous sesquioxide of iron. H., 5--5.5; G., 6.3--6.4, color of fracture, various shades of brown, commonly dark when earthy, brownish yellow, ochre yellow; S., yellowish brown. Comp., oxygen, 25.7; iron, 59.8; water 14.5.

LINARITE. Hydrous sulphate of copper and lead, H., 2.5; G., 5.5--5.45; color, deep azure blue; S., pale blue. Comp., sulphur trioxide, 20; lead oxide, 55.7; cupric oxide, 19.8; water, 4.5.

LODESTONE. Magnetite, highly magnetic, or exhibiting polarity.

LUCKITE. Variety of melanterite. Comp., sulphur, trioxide, 26.3; iron protoxide, 21.7; manganese oxide, 1.9; water, 42.2, with small quantities of magnesium, calcium, etc.

MAGNETITE. Sesquioxide and protoxide of iron. H.,

5.5--6.5; G., 5.16--5.18; color, iron black; S., black. Comp., oxygen, 27.6; iron, 72.4.

MALACHITE. Hydrous carbonate of copper. H., 3.5--4; G., 3.9--4.3; color, bright green; S., paler than color. Comp., carbon dioxide, 19.9; cupric oxide, 71.9; water, 8.2.

MALLARDITE. Hydrous sulphate of manganese. Colorless. Comp., sulphur trioxide, 28.9; manganese protoxide, 25.6; water, 45.5.

MANGANITE. Hydrous manganese oxide. H., 4; G., 2--4.44. Color, dark steel gray to iron black. S., reddish brown to nearly black. Comp., oxygen 27.3, manganese 62.4, water 10.3.

MARTITE. Iron sesquioxide in octahedral form, supposed to be pseudomorphous after magnetite or pyrite.

MELACONITE. Black cupric oxide. H., 3--4; G., 5.82--6.25; color, steel or iron gray in scales; when earthy black or grayish black, and ordinarily soiling the fingers when massive or pulverulent. Comp., oxygen, 20.2; copper, 79.8.

MELANTERITE. Hydrous ferrous sulphate. H., 2; G., 1.89--1.90; color, various shades of green to white. Comp., sulphur trioxide, 28.8; iron protoxide, 25.9; water, 45.3.

MIMETITE. Chlor-arsenate of lead. H., 3.5; G., 7--7.25; color, pale yellow to brown; color Utah mineral, white, colorless, pale yellow to orange yellow; S., white or nearly so. Comp., arsenic pentoxide, 23.2; lead protoxide, 74.9; chlorine, 2.4.

MINIUM. Oxide of lead. H., 2--3; G., 4.6; color, vivid red mixed with yellow; S., orange yellow. Comp., oxygen, 9.4; lead, 90.6.

MIRABILITE. Hydrous sodium sulphate. H., 1.5--2; G., 1.481; color, white. Comp., sulphur trioxide, 24.8; soda, 19.3; water, 55.9.

MIXITE. Hydrous arsenate of copper and bismuth. H., 3--4; G., 3.79; color, emerald green to bluish green, pale green or whitish; S., lighter than color. Comp., Utah mineral, arsenic pentoxide, 28.79; bismuth trioxide, 11.18; cupric oxide, 43.89; zinc oxide, 2.70, with traces of iron, calcium, prosphorus and silica.

MOLYBDENITE. Molybdenum disulphide. H., 1--1.5; G., 4.7--4.8; color, pure lead gray; S., bluish gray on paper; on porcelain, slightly greenish. Comp., sulphur, 40; molybdenum, 60.

MOLYBITE. Oxide of molybdenum. H., 1--2. G., 4.49--4.50. Color, straw yellow, yellowish white. Comp., Oxygen 33.3, molybdenum 66.7.

MONAZITE. Phosphate of cerium minerals. H., 5--5.5. G., 4.9--5.3. Color, hyacinth red, clove brown, reddish or yellowish brown.

MOSS AGATE. Chalcedony filled with dendritic or moss-like forms of manganese or magnetite.

MUSCOVITE. Mainly an orthosilicate of aluminium

and potassium. H., 2--2.5; G., 2.76--3; color, gray, brown, hair brown, pale green, violet, yellow, dark olive green, colorless, rarely rose red; S., uncolored. Comp., silica, 45.2; alumina, 38.5; potash, 11.8; water, 4.5.

OBSIDIAN. Volcanic glass. Comp., silica, usually microlitic.

OLIVENITE. Hydrous arsenate of copper. H., 3; G., 4.1--4.4; color, various shades of olive green passing into leek, siskin, pistachio, and blackish green, liver and wood brown, straw yellow, grayish white, white, various shades of red; S., olive green to brown. Comp., Utah variety (wood copper), arsenic pentoxide, 40.5; cupric oxide, 55.40; water, 3.39.

OLIVINE. Silicate of magnesium and iron. H., 6.5--7; G., 3.27--3.57; color, olive green, sometimes brownish, grayish red, grayish green; S., uncolored, rarely yellowish. Comp., approximately, silica, 42.30; magnesia, 51.40; iron oxide, 5.1; with traces of alumina, calcium, etc.

ONOFRITE. Sulpho-selenide of mercury. H., 2.5; G., 7.98--8.09; color and S., blackish lead gray. Comp., Utah mineral, sulphur, 11.68; selenium, 4.58; mercury, 81.93; with traces of zinc and manganese.

OPAL. Hydrous silica. H., 5.5--6; G., 1.9--2.3; when pure, G., 2.1--2.2; Utah mineral mostly the ordinary milky opal, without fire.

ORPIMENT. Arsenic trisulphide. H., 1.5--2; G., 3.4--3.5; color, lemon yellow of various shades; S., paler than color. Comp., sulphur, 39; arsenic, 61.

ORTHOCLASE. Silicate of aluminium and potassium. H., 6; G., 2.57; color, white, pale yellow, flesh red, gray, rarely green, colorless, S., uncolored. Comp., silica, 64.7; alumina, 18.4; potash, 16.9.

OZOCERITE. Hydrocarbon. G., Utah mineral, 0.971; color, Utah mineral, black, greenish black, waxy. Comp., carbon, 85.44; hydrogen, 14.45.

PHARMACOSIDERITE. Hydrous arsenate of iron. H., 2.5; G., 2.9--3; color, olive green, blackish green, honey yellow to yellowish brown, grass green, hyacinth red, emerald green; S., green to brown, pale yellow. Comp., arsenic pentoxide, 43.1; iron sesquioxide, 40; water, 16.9.

PEARCEITE. Sulph-arsenite of silver. H., 3; G., 6.15; color and S., black. Utah crystals generally bluish externally. Comp., approximately, sulphur, 17.71; arsenic, 7.39; silver, 55.17; copper, 18.11, with traces of iron, etc.

PITTISCITE. Hydrous arsenate and sulphate of ferric iron, of doubtful formula. H., 2--3; G., 2.2--2.5; color, yellowish to reddish brown, blood red, white. S., yellow to white. Comp., Utah mineral, arsenic pentoxide, 39.65; sulphur trioxide, 1.14; iron sesquioxide, 33.89; cupric oxide, 1.17; silica, 1.92; insoluble, 4.08.

PROSOPITE. Hydrous fluoride of aluminium and calcium. H., 4.5; G., 2.88--2.89; color, white, grayish, colorless. Utah mineral, bluish white to turquoise blue. Comp., Utah mineral, fluorine, 29.95; calcium, 16.85; aluminium, 22.74; water, 16.12; oxygen, 14.34.

PROUSTITE. Sulph-arsenide of silver. H., 2--2.5; G., 5.57--5.64; color, scarlet vermilion; S., like color, inclined to red. Comp., sulphur, 19.4; arsenic, 15.2; silver, 65.4.

PRASE. Dull leek green quartz.

PYRARGYRITE. Sulph-antimonide of silver. H., 2.5; G., 5.57--5.86; color, dark red or black to grayish black, by transmitted light deep red; S., purplish red. Comp., sulphur, 17.8; antimony, 22.3; silver, 59.9.

PYRITE. Iron di-sulphide. H., 6--6.5; G., 4.95--5.10; color, pale brass yellow; S., greenish black or brownish black. Comp., sulphur, 53.4; iron, 46.6.

PYROLUSITE. Manganese dioxide. H., 2--2.5; G., 4.69--4.86; color, iron black, dark steel gray, sometimes bluish; S., black or bluish black, sometimes submetallic. Comp., manganese oxide, 79.14; oxygen, 17.27; water, 2.33, with traces of calcium, etc.

PYROMORPHITE. Phosphate and chloride of lead. H., 3.5--4; G., 6.5--7.1; color, green, yellow, brown, grayish white, white, wax yellow, orange yellow; S., white, sometimes yellowish. Comp., phosphorus pentoxide, 15.7; lead protoxide, 82.2; chlorine, 2.6.

PYROPE. Magnesia alumina garnet. H., 7--7.5; G., 3.70--3.75; color, deep red to nearly black, orange brown, purplish red. Comp., silica, 44.8; alumina, 25.4; magnesia, 29.8.

QUARTZ. Silicon dioxide. H., 7; G., 2.60--2.65; colorless when pure, often various shades of yellow, red, brown, green, blue, black; S., white when pure; if impure, often of same color, but paler. Comp., oxygen, 53.3; silicon, 46.7.

REALGAR. Arsenic mono-sulphide. H., 1.5--2; G., 3.556; color, aurora red to orange yellow; S., orange red to aurora red. Comp., sulphur, 29.9; arsenic, 70.1.

RHODOCHROSITE. Manganese protocarbonate. H., 3.5--4; G., 3.45--3.60 and higher; color, various shades of rose red, yellowish gray, fawn colored, dark red, brown; S., white. Comp., carbon dioxide, 38.3; manganese protoxide, 61.7; iron carbonate frequently present, and carbonates of calcium, magnesium, zinc, and rarely cobalt.

SATIN SPAR. Finely fibrous variety of gypsum, with pearly opalescence.

SCORODITE. Hydrous ferric arsenate. H., 3.5--4; G., 3.1--3.3; color, pale leek green or liver brown; S., white. Comp., arsenic pentoxide, 49.8; iron sesquioxide, 34.6; water, 15.6.

SELENITE. Crystalized gypsum.

SILVER. Native silver.

SMITHSONITE. Carbonate of zinc. H., 5; G., 4.30--4.45; color, white, grayish, greenish, brownish, sometimes brown, green, blue green or yellow; S., white. Comp., carbon dioxide, 35.2; zinc protoxide, 64.8.

SPHALERITE. Sulphide of zinc. H., 3.5--4; G., 3.9--4.1; color, yellow, brown, black, red, green to white, when pure, nearly colorless; S., brownish to light yellow, and white. Comp., sulphur, 33; zinc, 67.

STIBNITE. Sulphide of antimony. H., 2; G., 4.52--4.62; color and S., lead gray, inclined to steel gray. Comp., sulphur, 28.6; antimony, 71.4.

STEPHANITE. Sulph-antimonate of silver. H., 2--2.5; G., 6.2--6.3; color and S., iron black. Comp., sulphur 16.3; antimony, 15.2; silver, 68.5.

SPHERULITES. Globular concretions consisting of orthoclase of a light gray color, and in the Utah obsidian having a radiating fibrous structure.

TETRADYMITE. Telluride of bismuth. H., 1.5--2; G., 7.2--7.6; color, pale steel gray. Streak soils paper. Comp., approximately tellurium, 48; bismuth, 52.

TETRAHEDRITE. Sulph-antimonate of copper. H., 3.5--4; G., 4:4--5.1; color, between flint gray and iron black; S., like color, sometimes inclined to brown and cherry red. Comp., sulphur, 23.1; antimony, 24.8; copper, 52.1.

TIEMANNITE. Mercuric selenide. H., 2.5; G., Utah crystals, 8.30--8.47; color, steel gray to blackish lead gray; S., nearly black. Comp., Utah mineral, selenium 29.19; mercury, 69.84; with traces of sulphur and calcium.

TOPAZ. Fluo-silicate of aluminium. H., 8; G., Utah mineral from Thomas Mts., 3.565; color, straw yellow, wine yellow, white, grayish, greenish, bluish, reddish. Utah mineral sherry colored, colorless, white, grayish, black; S., uncolored. Comp., Utah colorless crystals, silica, 31.93; alumina, 56.26; fluorine, 20.37; water, 0.19; less 0.8.58.

TOURMALINE. A complex silicate of boron and aluminium. H., 7--7.5; G., 2.98--3.20; color, black, brownish black, bluish black, most common, sometimes rich shades of blue, green, red, rarely white or colorless. Sometimes red internally and green externally, or banded in various shades of colors mentioned.

TRAVERTINE. Limestone deposited in beds from calcareous solutions, usually banded in various colors, such as lemon yellow, orange yellow, brown, black, greenish, grayish. Frequently contains a small amount of silica.

TSCHERMIGITE. Hydrous sulphate of aluminium and ammonium. H., 1--2; G., 1.50; color, white. Comp., ammonium sulphate, 14.6; aluminium sulphate, 37.7; water, 47.7.

TYROLITE. Hydrous arsenate of copper. H., 1--1.5;

G., 3.02--3.09; color, pale apple green, green and verdigris green, inclining to sky blue; S., paler than color. Comp., Utah mineral, arsenic pentoxide, 28.78; cupric oxide, 45.52; calcium oxide, as an impurity, 6.84; water, 17.26; with small quantities of zinc, magnesia, etc.

URANINITE. Uranate of uranyl. H., 5.5; G., 9--9.7; color, grayish, greenish, olive green, velvet black; S., brownish black, grayish, olive green, a little shining. Rich in uranium, and usually containing the rare metals, zirconium, lanthanum, yttrium, and sometimes small quantities of nitrogen and lead.

UTAHITE. Hydrous sulphate of iron. Color, orange yellow, with silky lustre. Comp., sulphur trioxide, 28.45; iron sesquioxide, 58.82; water, 9.35; arsenic pentoxide, 3.19.

VARISCITE. Hydrous phosphate of aluminium. H., 4; G., 2.408; color, deep emerald green, bluish green to colorless. Comp., Utah mineral, phosphorous pentoxide, 44.40; alumina, 32.65; water, 22.95.

VESUVIANITE. A basic calcium-aluminium silicate of uncertain formula. H., 6.5; G., 3.35--3.45; color, brown to green, occasionaly sulphur yellow, and pale blue. S., white.

WARDITE. Hydrous phosphate of aluminium. H., 5; G., 2.77; color, green, bluish green; S., white. Comp., phosphorus pentoxide, 34.46; aluminium trioxide, 38.25; sodium oxide, 5.98; magnesium oxide, 2.40; with small quantities of copper, iron and potassium oxides, water 17.87.

WHEELERITE. A yellowish resin, resembling amber. Melts at 154 degrees. Comp., about, carbon, 73.07; hydrogen, 7.95; oxygen, undetermined.

WOLLASTONITE. Calcium meta-silicate. H., 4.5--5; G., 2.8--2.9; color, white inclined to gray, yellow, red, or brown; S., white. Comp., silica, 51.7; lime, 49.3.

WULFENITE. Molybdate of lead. H., 2.75--3; G., 6.7--7; color, wax yellow, passing into orange yellow, siskin and olive green, yellowish gray, grayish white to nearly colorless, brown, also orange to bright red; S., white. Comp., molybdenum trioxide, 39.3; lead oxide, 60.7.

WURTZILITE. Hydrocarbon compound. H., 2--3; G. 1.03; color, jet black, brilliant, in very thin plates deep red by transmitted light. Somewhat sectile, and thin shavings show some elasticity.

ZEUNERITE. Arsenate of copper and uranium. H., 2--2.5; G., 3.2; color, grass green to emerald and apple green, greenish yellow. Comp., arsenic pentoxide, 22.3; uranium, trioxide, 56; cupric oxide, 7.7; water, 14.

ZINCITE. Zinc oxide. H., 4--4.5; G., 5.43--5.7; S., orange yellow; color, deep red, also orange yellow. Comp., oxygen, 19.7; zinc, 80.3.

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